

ASTER Sensor Artifacts

- Saturation
- Blooming
- Spikes
- Near-zero counts

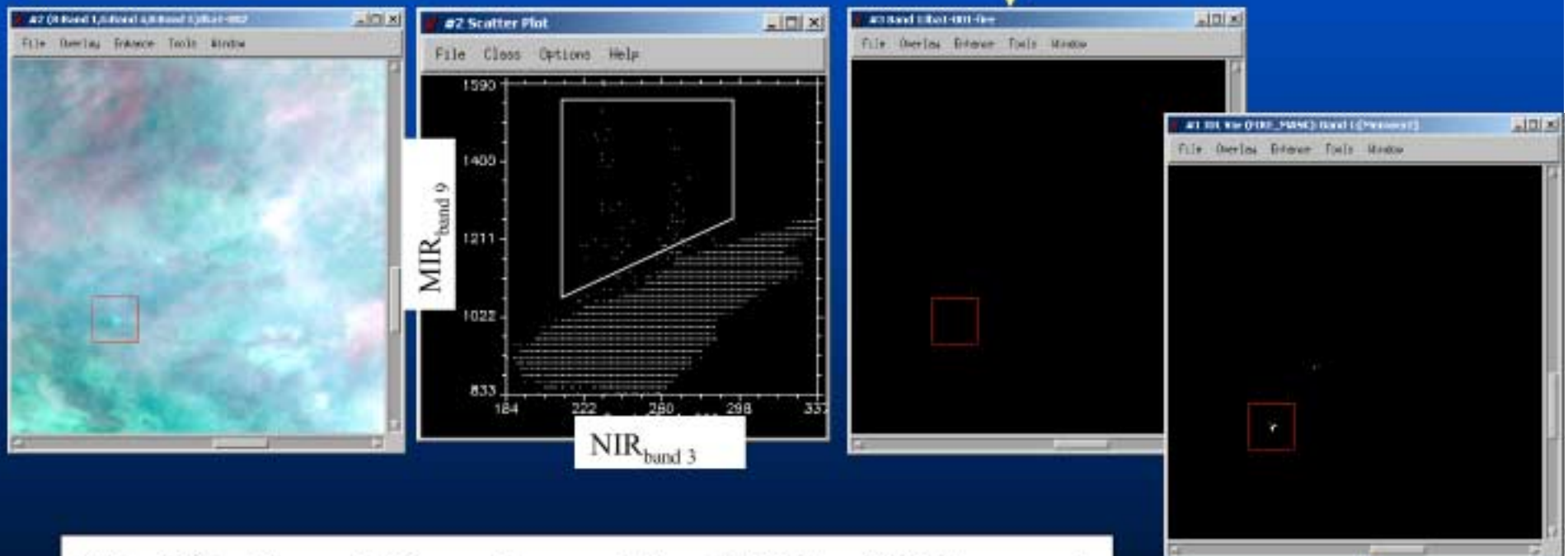


Fire Detection Approach

Convert DN to reflectance

Classify as fire when: $MIR_{b8}/NIR_{b3} > R$ and $MIR_{b3} - NIR_{b8} > D$

Visual inspection



Modify R and D and consider MIR_{b9}/NIR_{b3} and absolute threshold for MIR_{b9}

ASTER imagery

- Plan to apply ASTER algorithm to all available imagery and continue acquisitions

- **MODIS “Stage 2 Validation”:**

Product accuracy has been assessed over a widely distributed set of locations and time periods via several ground-truth and validation efforts.

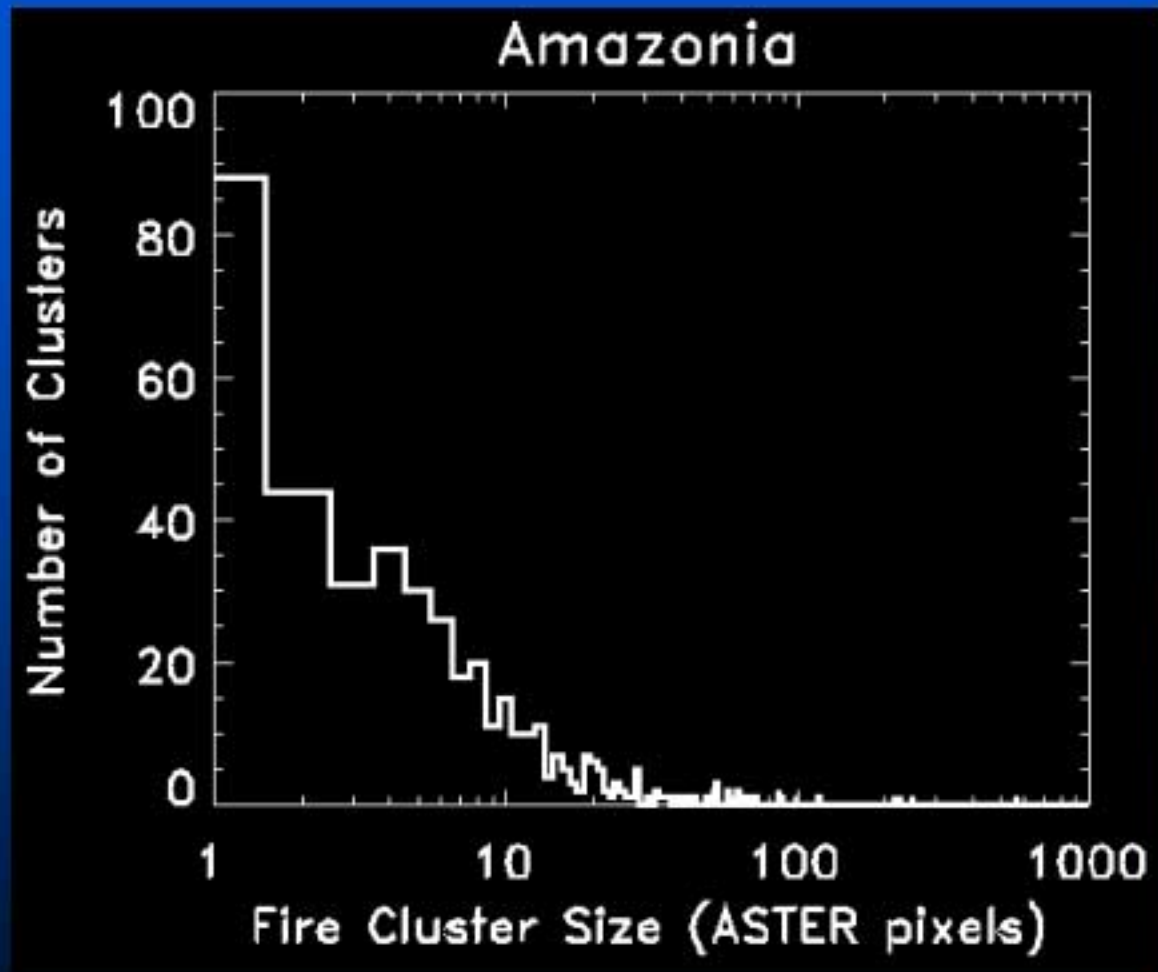
All scenes have

at least one MODIS
active fire detection
One MODIS
active fire detection
with the Global Observation of Forest
Cover/Land Dynamic (GOFC/GOLD) Fire
Implementation team

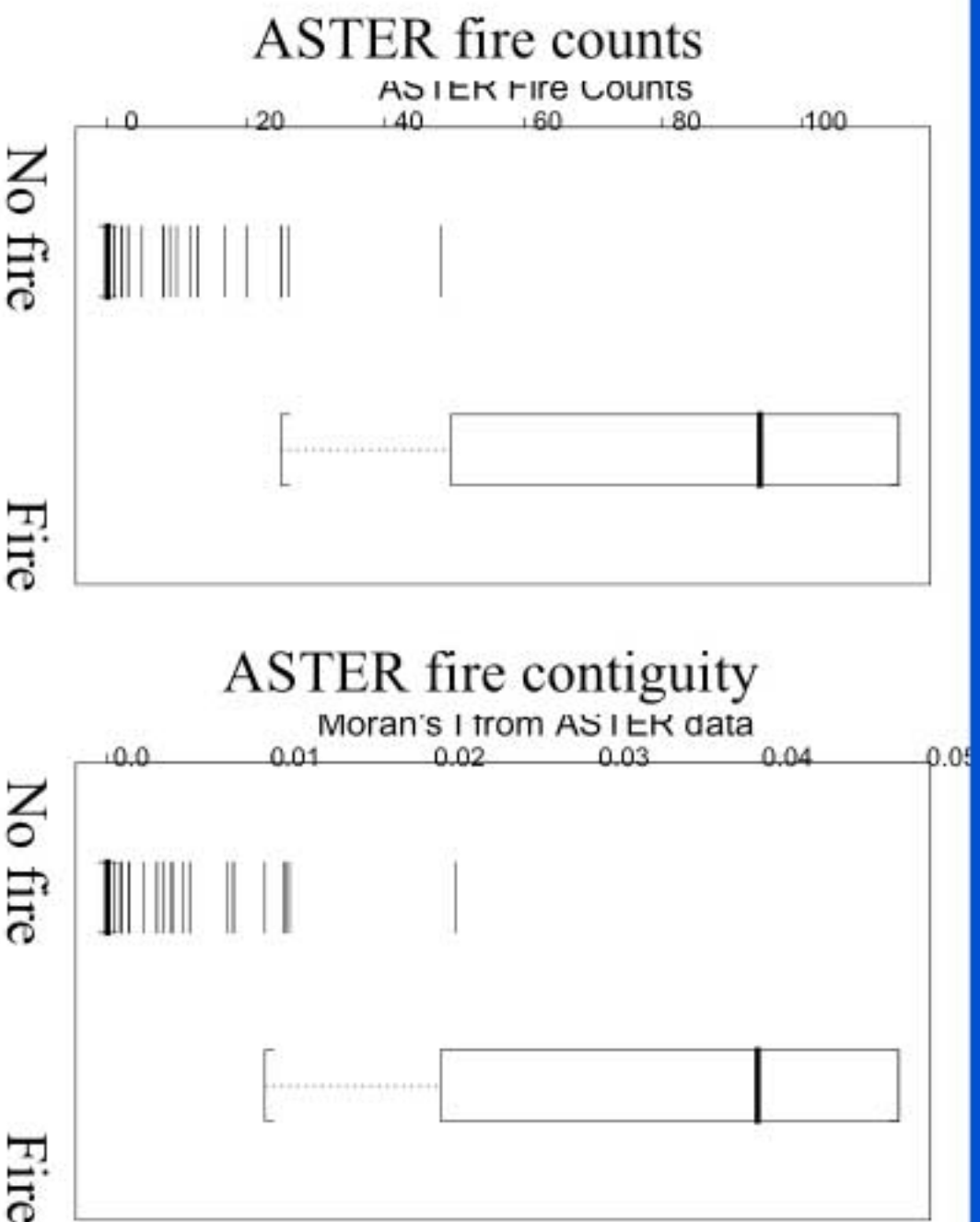
Santarem
campaign



Preliminary ASTER Results



ASTER Analysis, one scene



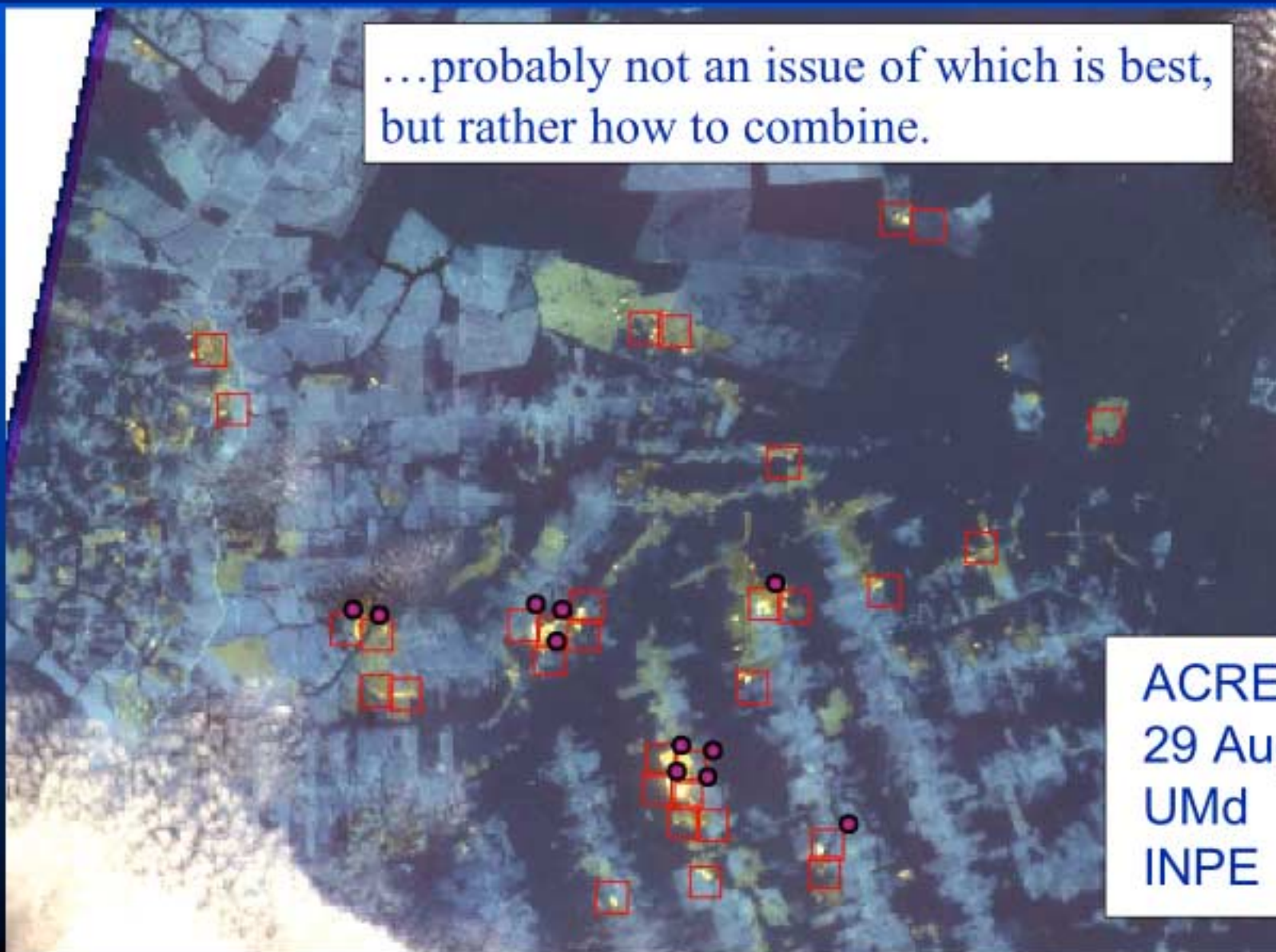
Research Topics



- Modeling the probability of MODIS fire detection based on recent 20 ASTER scenes
- Compare INPE and NASA/UMd fire product
- Estimate fire counts/fire regimes through Brazil, accounting to view angle dependency
- Land cover / time series analysis – including understory burns
- Burnt area validation

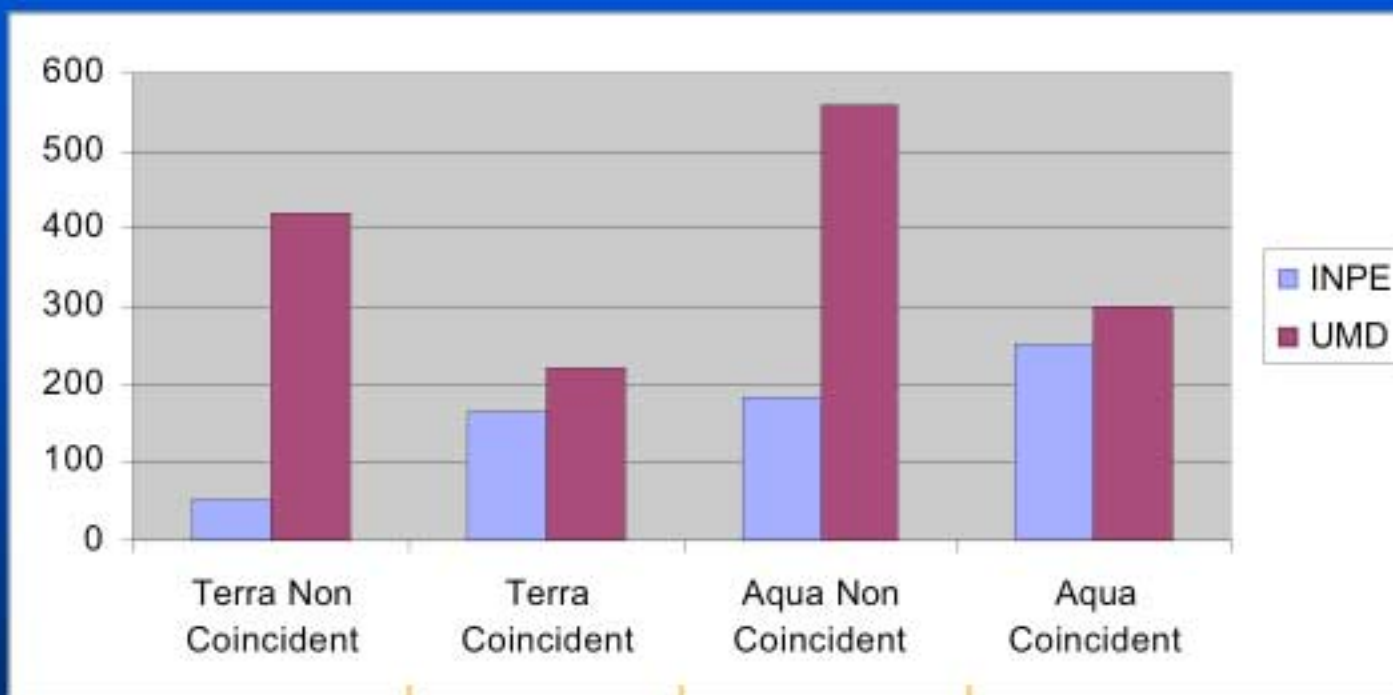
MODIS fire detection: INPE and UMd

...probably not an issue of which is best,
but rather how to combine.



ACRE
29 Aug 2003
UMd 
INPE 

MODIS fire detection: Brazil February 2004

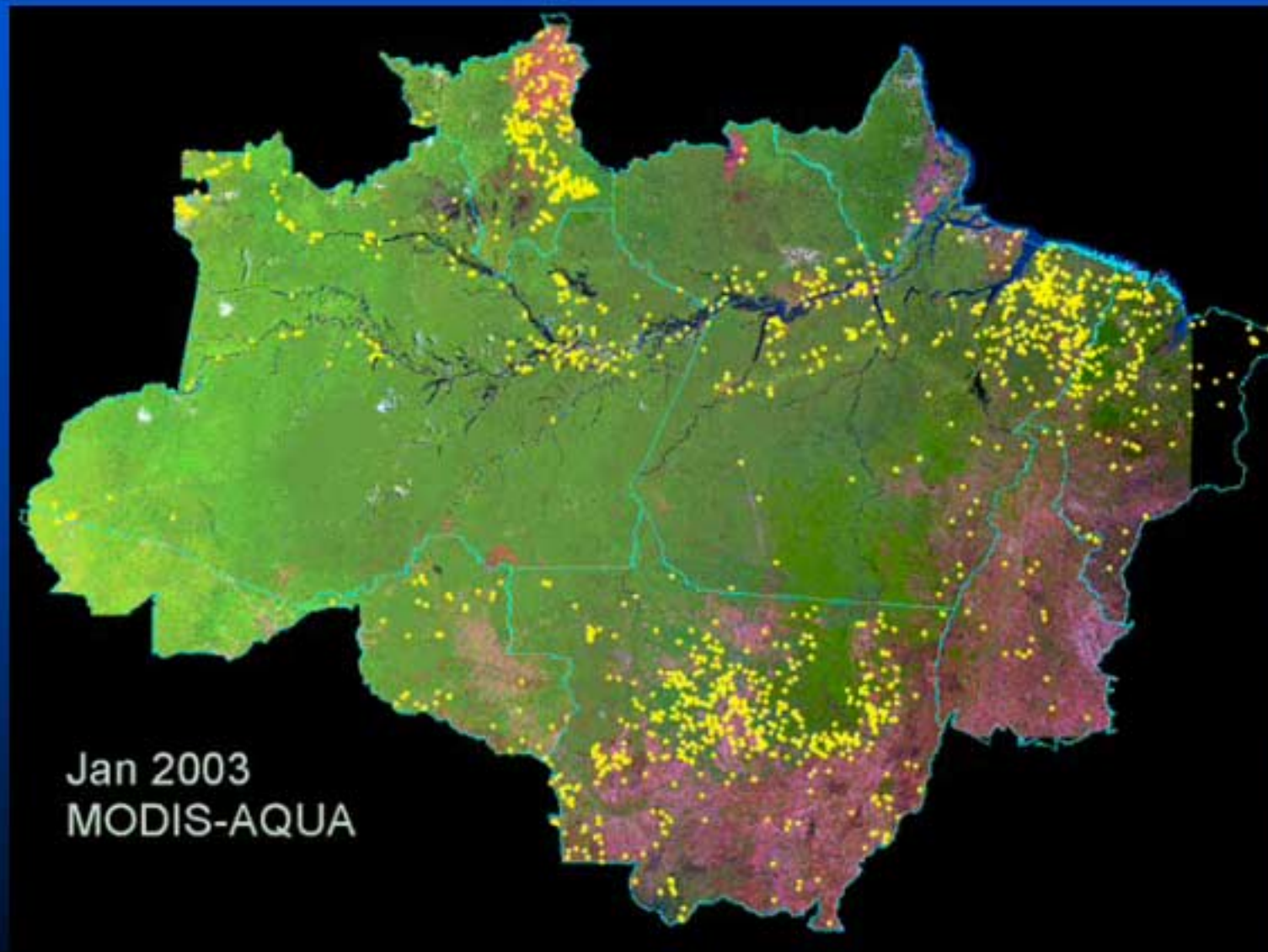


X =	1.6	1.4	1.5	1.3
Y =	1.2	1.1	1.2	1.1

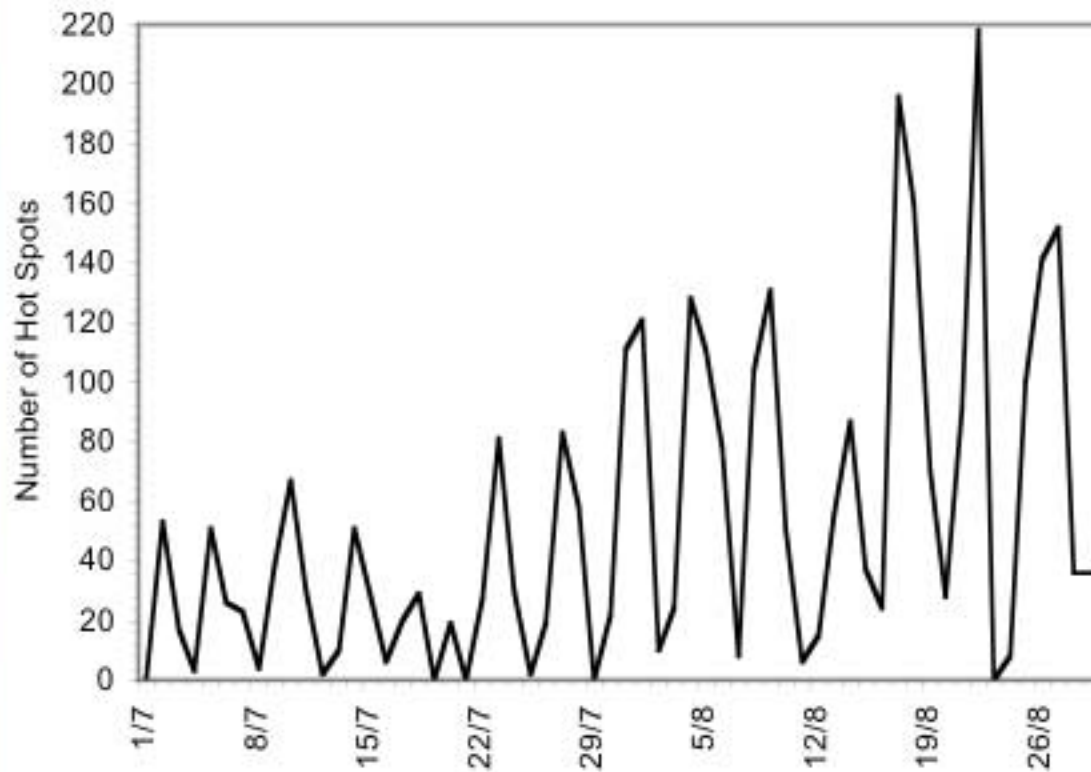
Average pixel size

– indication that non-coincident fire are further from NADIR

Brazilian fire regimes

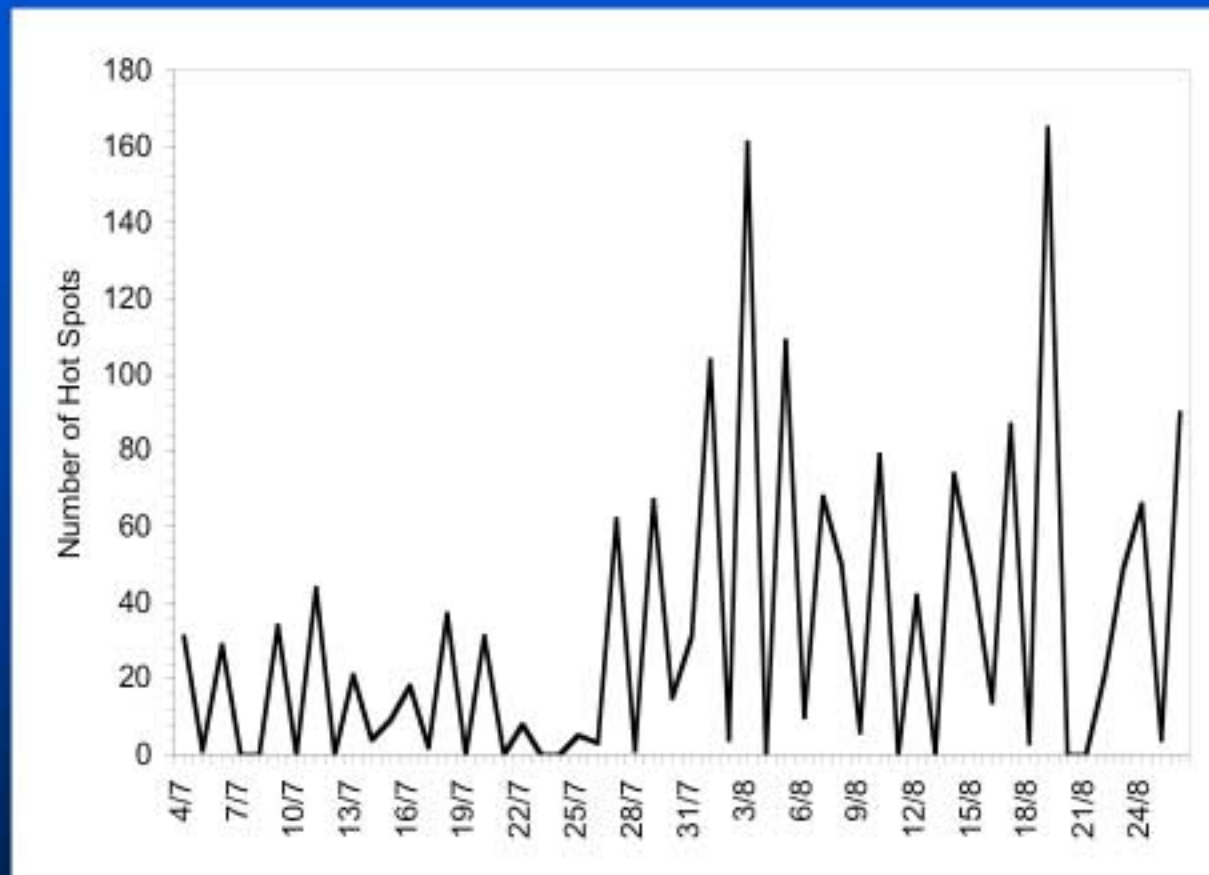


View Angle dependency



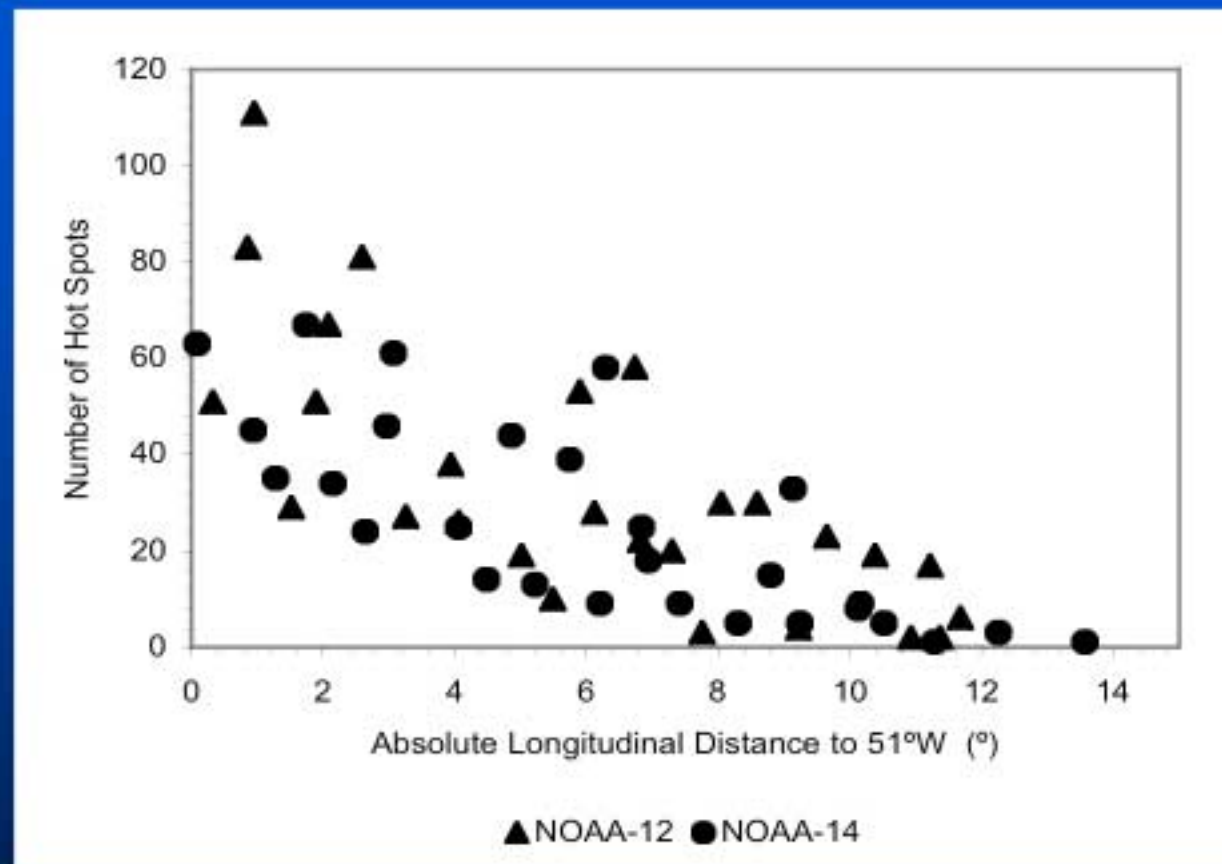
**NOAA-12 hot spot detection for Tocantins State – Brazil
July-August 2001. (x axis = date dd/m)**

View Angle dependency



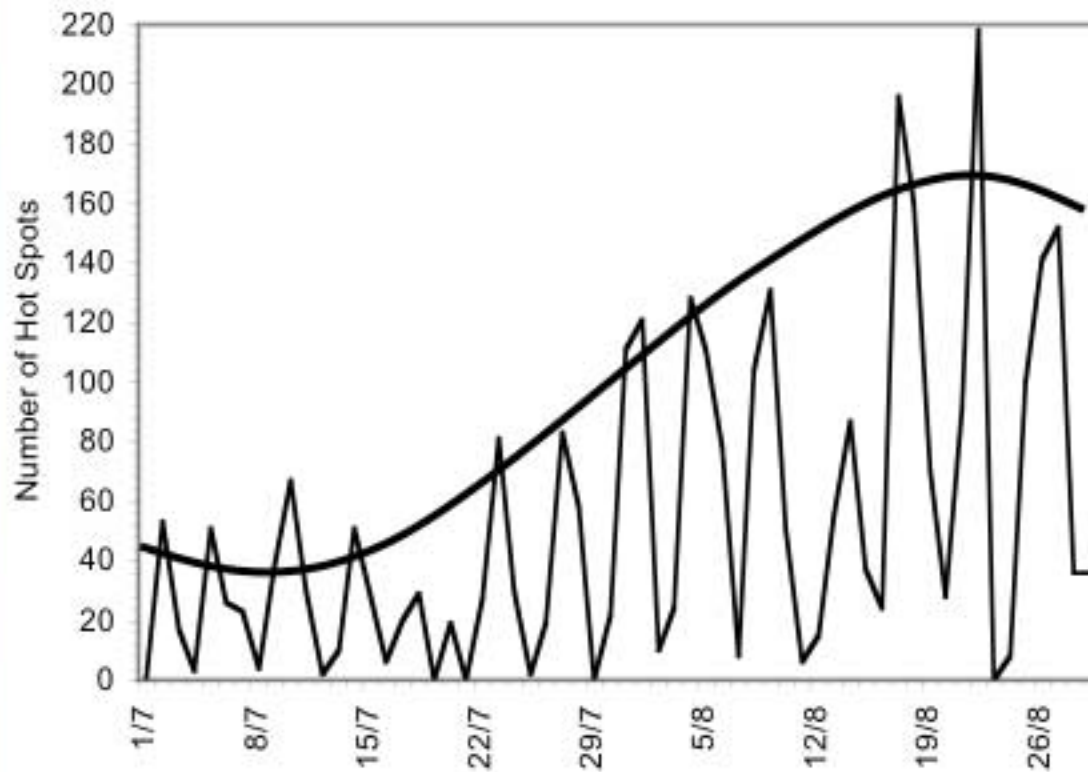
**Terra/MODIS hot spot detection for Tocantins State – Brazil;
July-August 2001**

View Angle dependency



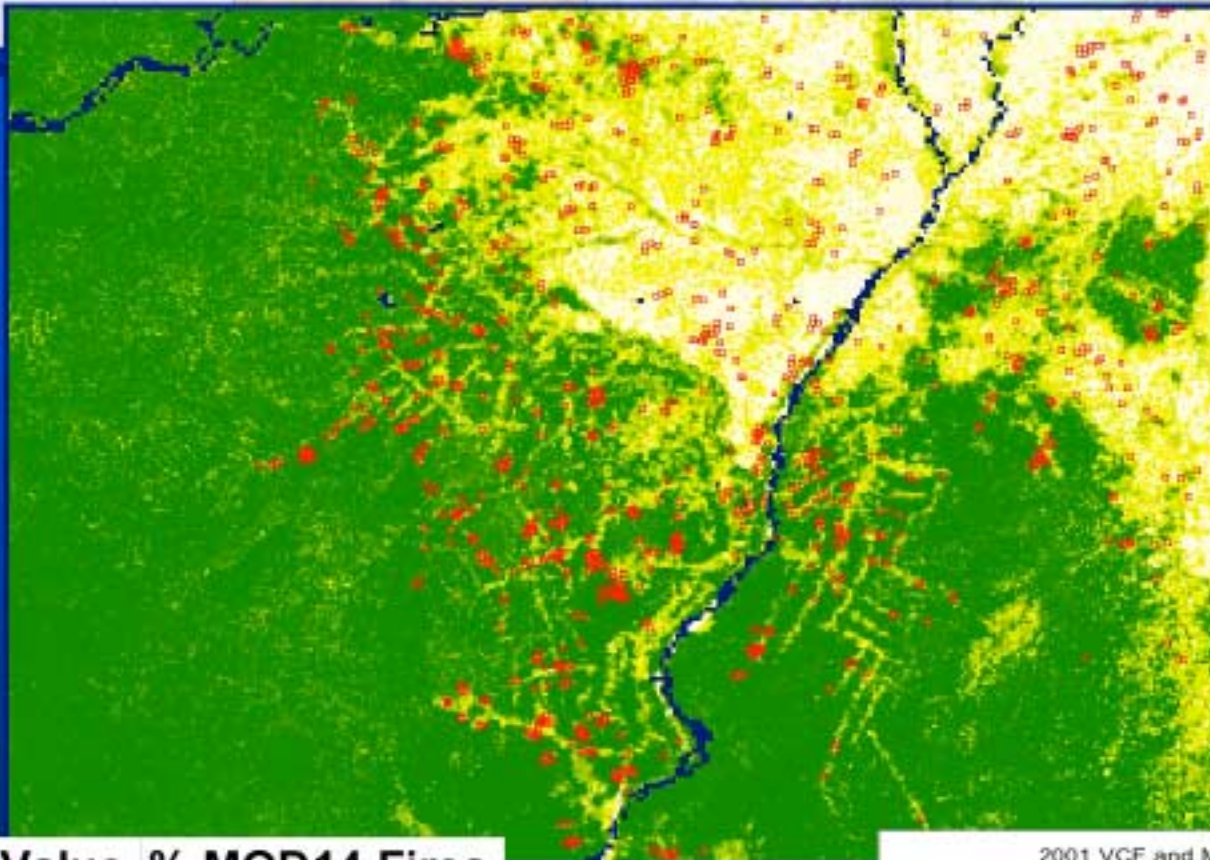
Hot spot detection (NOAA-12 and NOAA-14) versus absolute longitudinal distance of image nadir to 51 W (center longitude of Tocantins State) for July 2001.

Curve fitting for regional summaries



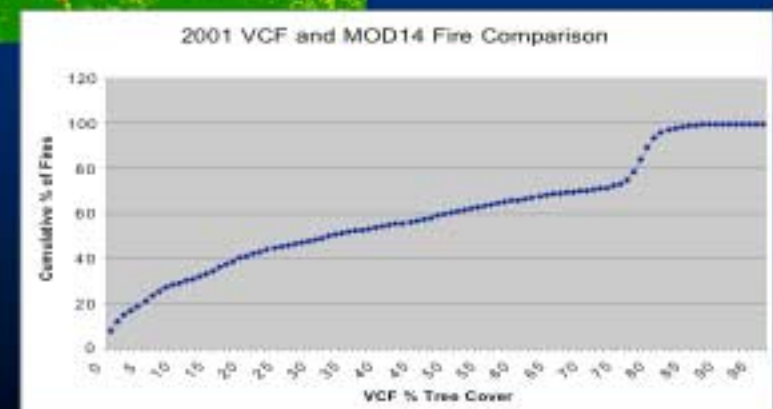
**Fit curve to fire counts filter for low viewing angle -
Take area under the curve to represent fire counts**

MODIS Fire and % tree cover analysis



2001 VCF Value	% MOD14 Fires
0 - 19	40.4
20 - 39	13.7
40 - 59	11.7
60 - 79	23.7
80 - 95	10.5

↑ Non forest
↓ Forest



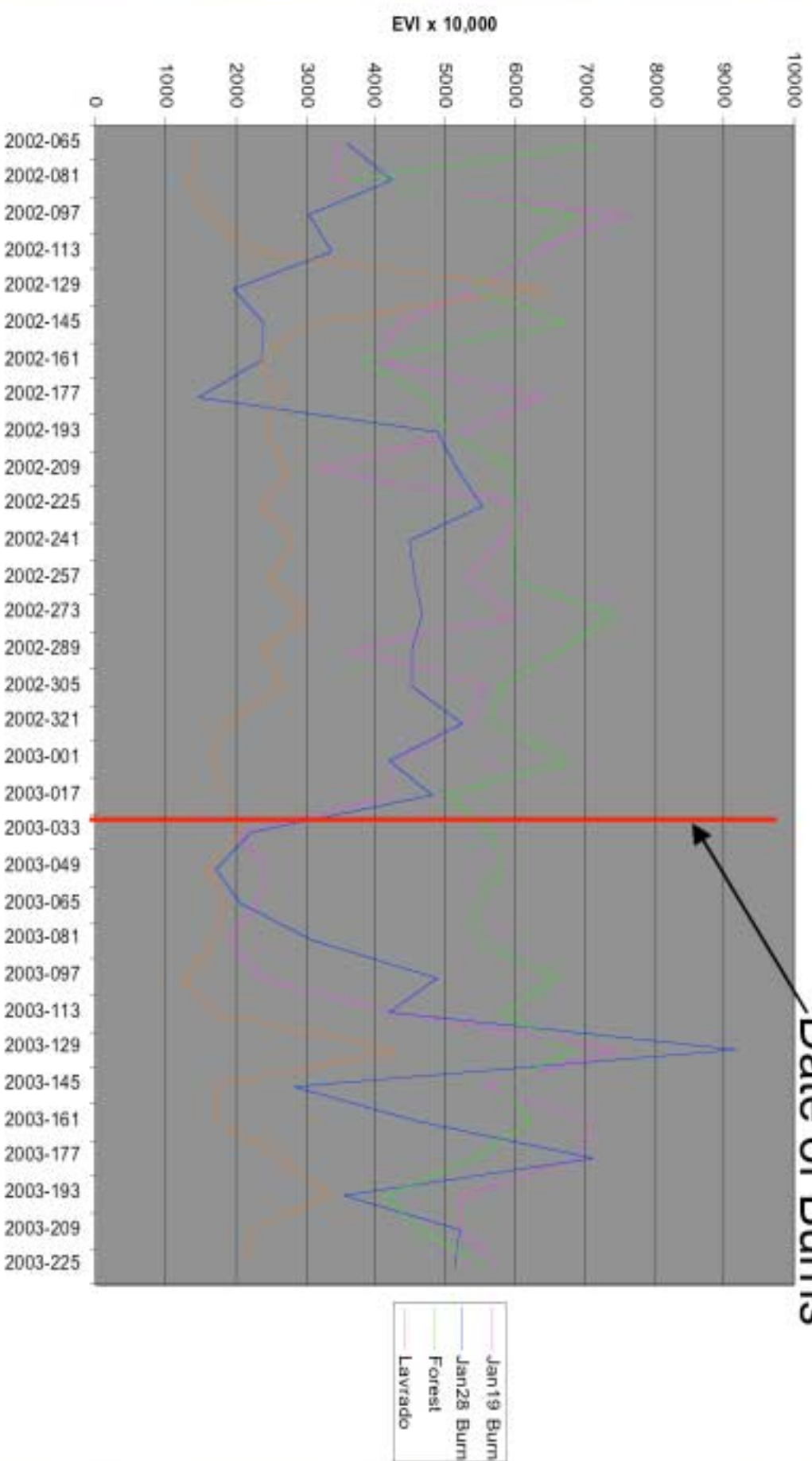
MODIS Fire & PRODES land cover analysis

PRODES Classification	Percent
Non Forest	34.4
2001 Deforestation or Forest	41.5
Clouds/Water	10.1
Deforestation 2001/Clouds 2000	4.7
Outside of PRODES Scenes	9.3

Only 2001 data are presented due to a limited number of fires after MODIS Data collection began in 2000. Clouds in ETM limit the understanding of the fire time series—10.1% Under clouds in the scenes, and 9.3% in scenes that were not Selected for PRODES analysis due to clouds.

MODIS time series analysis

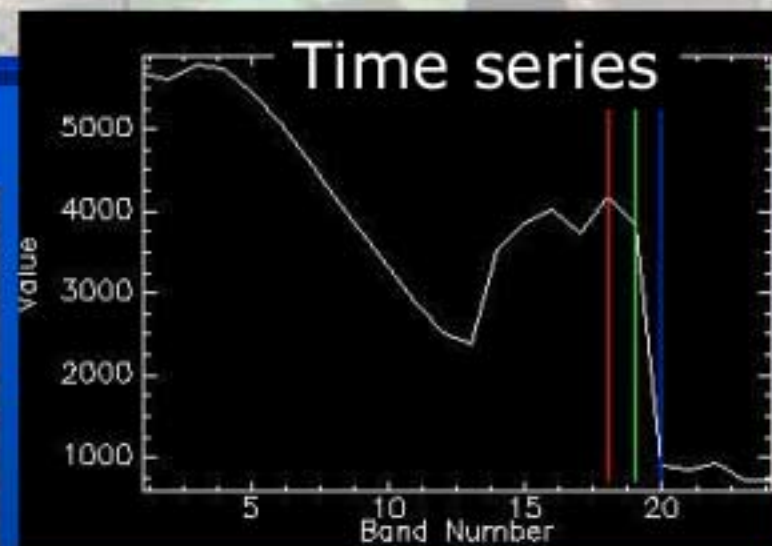
EVI Time Series Comparison



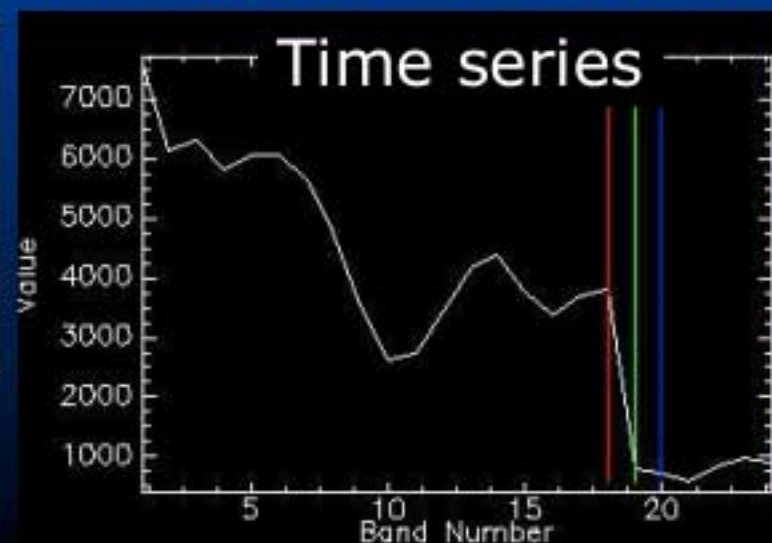
MODIS time series analysis: Mato Grosso



Sinop, Mato Grosso
2002-2003 Time Series



EVI time series shows deforestation
Fires from two adjacent time periods



Understory fire in Parque Nacional de Virua, Roraima

Legend

Hot Pixels 2/1-2/24/04



Satellite

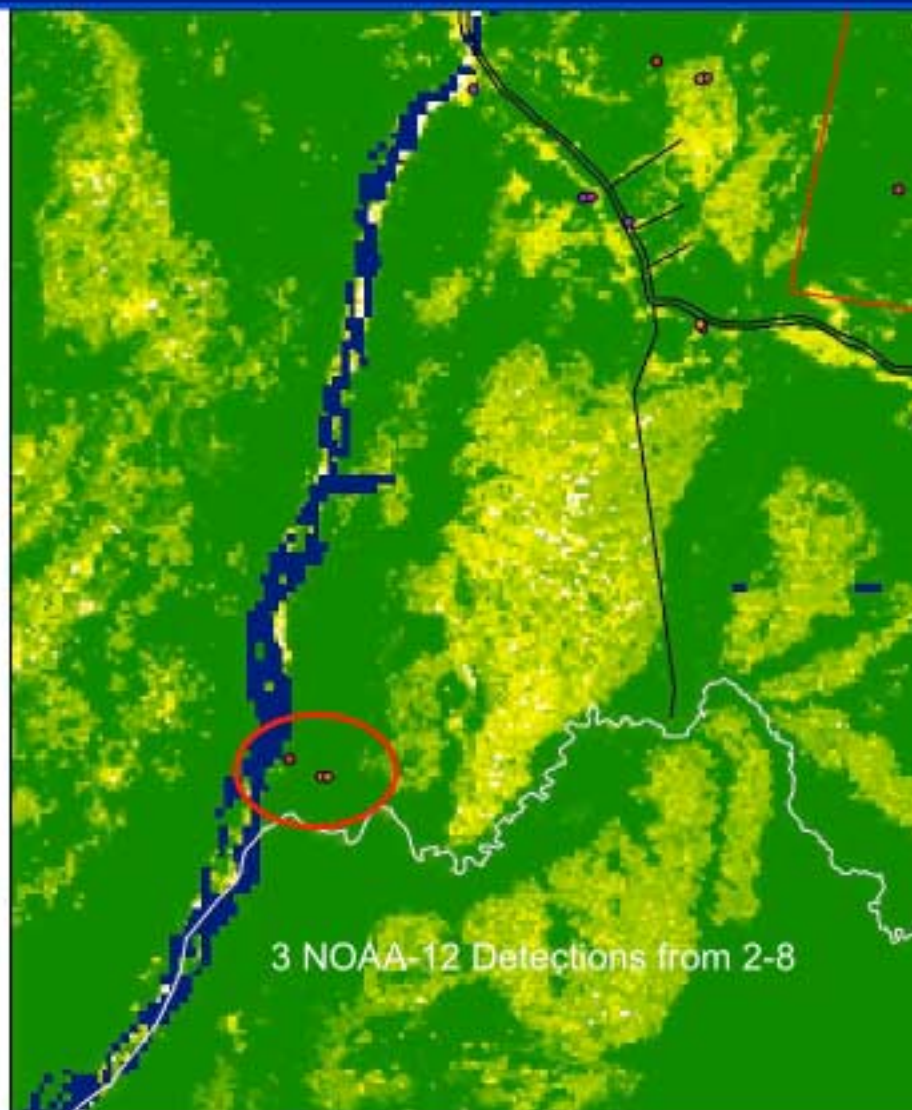
- GOES-12
- MODIS-01D
- MODIS-01N
- NOAA-12
- NOAA-12T
- NOAA-16
- NOAA-16N

— roads

□ Municipios

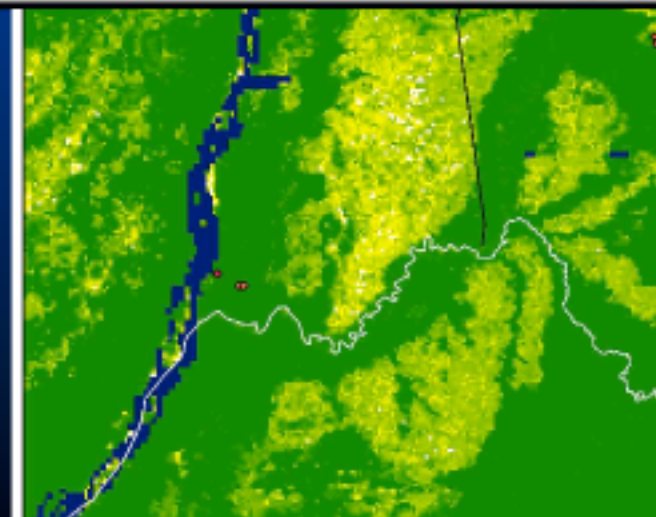
50

Kilometers



3 NOAA-12 Detections from 2-8

Fire Burned from Jan. 30th-Feb. 13th, 2004. Size = 50ha



Drop in NDVI (yellow) from 0.85 to 0.65 visible in MOD13 data between 017-048

Monitoring the Signature of Understory Fires



- Time series of vegetation indices: 2003 vs. 2004
- Pre-fire and post-fire ASTER data were collected
- Cloud-free MOD09 data from before, during, and after fire

Future work



- Burn Scar validation (MODIS product in production, existing field work and data can be used)
- August 2004: Eastern Para/Northern Mato Grosso (coordinated with Nepstad, Yokelson and Carvalho)
- Use of accuracy assessment to establish error bars on regional statistics – day long workshop adjacent to LBA meeting in Brazilia

Conclusions

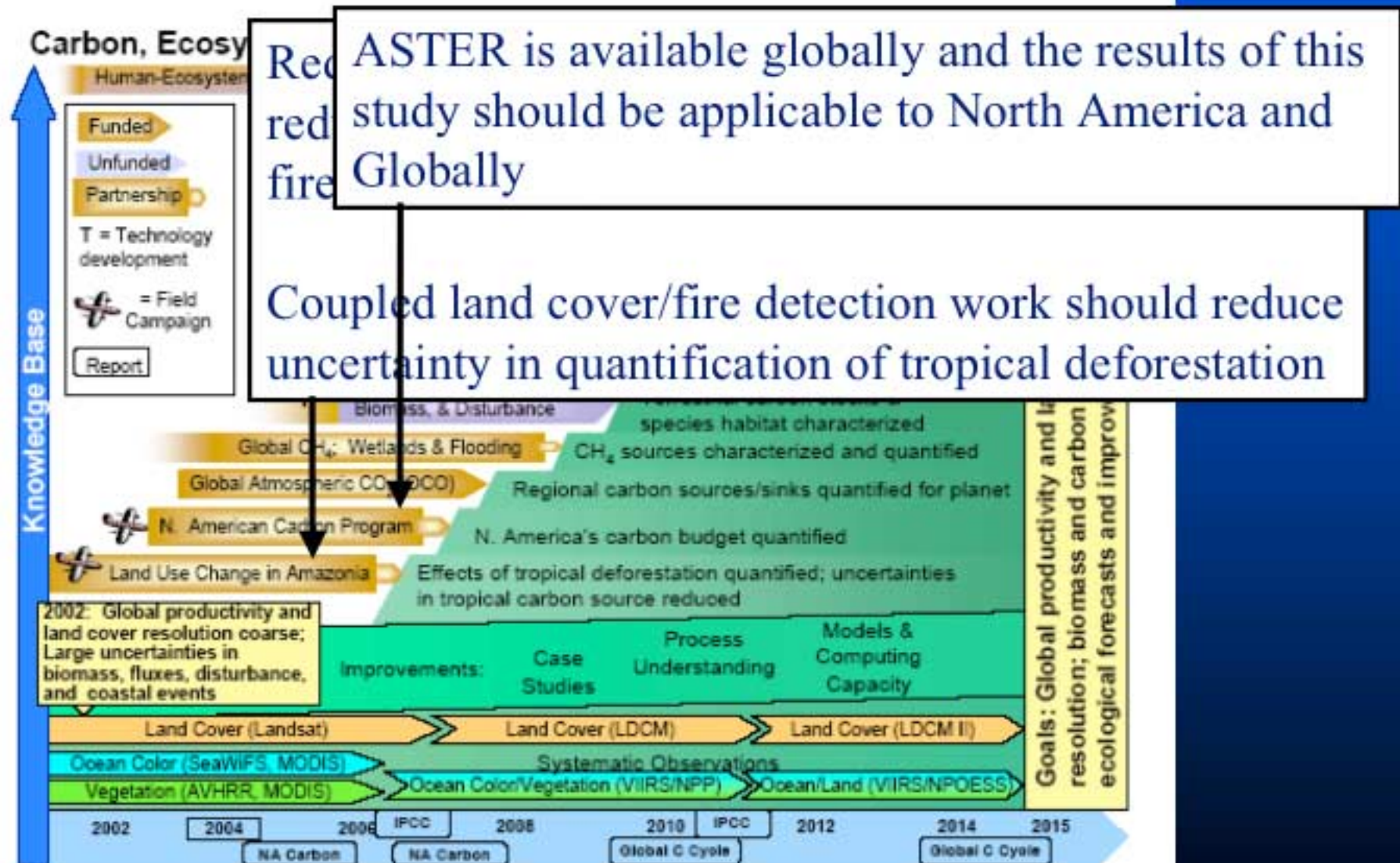
- For prescribed burns, MODIS Terra detected fire and accurate ASTER fire map is possible
- ASTER provided data to compare INPE and UMD algorithm
- Proper, *automated*, ASTER fire detection algorithm has proven to be a challenge, but we have an algorithm and will do 100% visual inspection
- Comparison with land cover dynamics provided added insight to hot-spot statistics
- Apparent signal in the MODIS vegetation index time series is promising

Issues affecting the project



- FireMapper II still not delivered to Brazil
- Wilfrid Schroeder to enroll in UMd/Geography PhD program
- Doug Morton to enroll in UMd/Geography PhD program

Implications...



The end...

